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(56) Documents Cited:
 GB 1234568 A GB 1234567 A
 WO 1998/057864 A WO 1997/037900 A
 FR 002842177 A US 20030034323 A1

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 INT CL B65D
 Other: Online: EPODOC, WPI

(54) Abstract Title: **A tamper evident closure**

(57) The closure includes a dispensing part (12) and a cap part (14). The dispensing part includes a base formation, for seating on a neck of a container, and a dispensing nipple formation (24). The cap part includes a dome formation and a skirt formation (18), the latter formation including a tamper evident band (16) that is attached to the remainder of the cap part via a frangible formation. The cap part is hingedly (40) connected to the dispensing part and, when hinged closed, covers the nipple formation. The cap part is made hinged open and when it is first closed, the tamper evident band is interengaged with the dispensing part. Upon subsequent opening of the cap part, the frangible formation is severed, leaving the tamper evident band (16) behind on the base formation and permitting the cap part to pivot and expose the nipple formation.

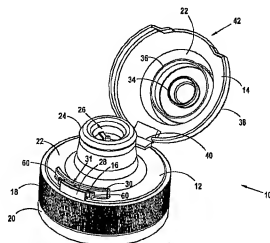


FIG. 1

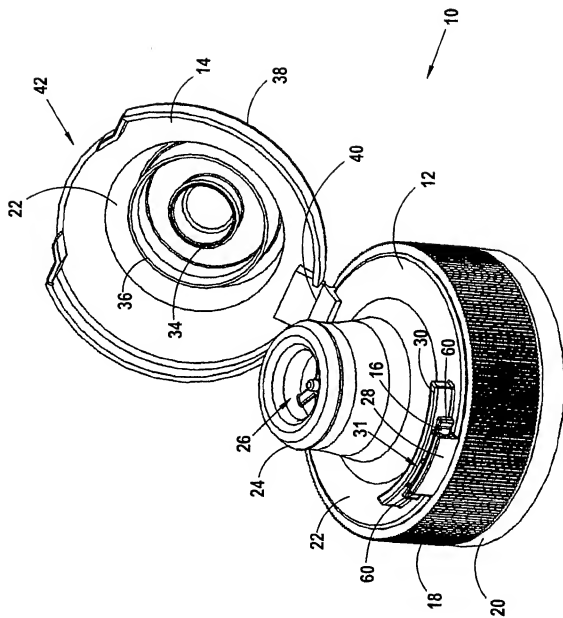


FIG. 1

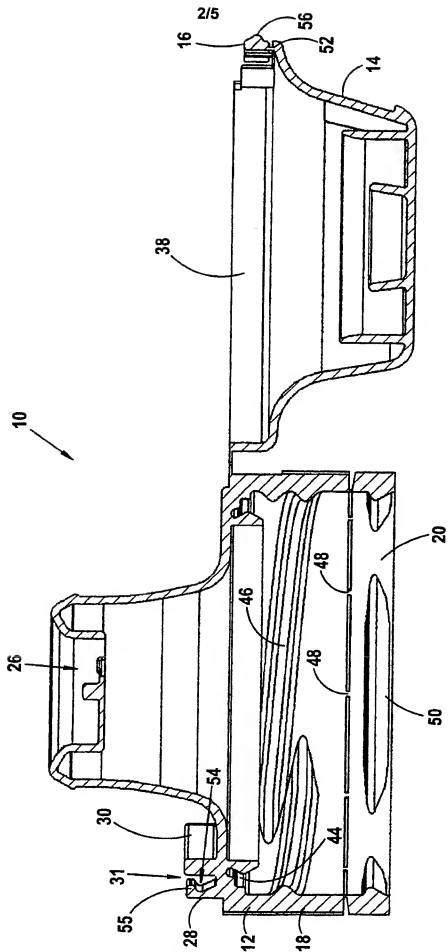


FIG. 2

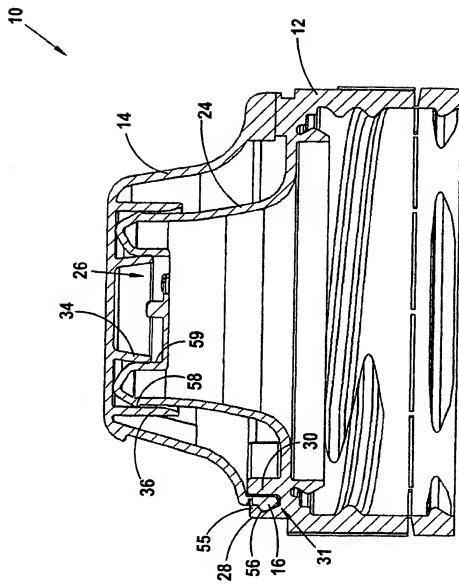


FIG. 3

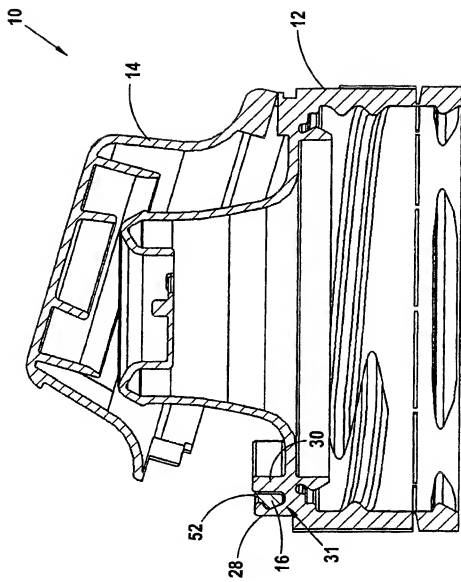


FIG. 4

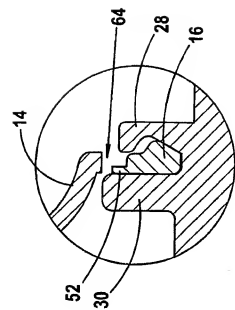


FIG. 6

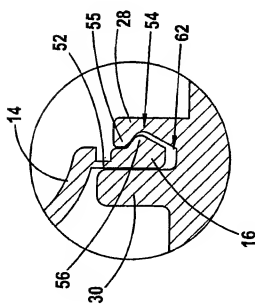


FIG. 5

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A TAMPER EVIDENT CLOSURE

THIS INVENTION relates to a tamper evident closure.

The invention relates, more particularly, to a tamper evident closure for an orifice defined within a rim defined at an end of a neck of a container, for example a container
5 for a liquid. As such, any reference hereinafter to a container must be interpreted as a reference to a container defining a neck including a rim around an orifice at an end of the neck.

10 According to the invention there is provided a tamper evident closure which includes

a dispensing part including a base formation, for seating on and sealingly engaging a rim defined by a neck of a container around its orifice, and a dispensing nipple formation, projecting from the base formation; and

15 a cap part including a dome formation and a skirt formation along at least a part of the periphery of the dome formation, the skirt formation defining a free edge along its side opposite to the dome formation,

and in which

the cap part is connected to the dispensing part via a hinge formation and the
5 closure is injection moulded with the cap part in an open position with respect to the
dispensing part, in which the cap part does not cover the nipple formation and from
which, once the closure is removed from the mould, the cap part is pivotally displaceable
about the hinge formation into a closed position with respect to the dispensing part, in
which it covers the nipple formation and hermetically seals it and in which the free edge
10 of the skirt formation is disposed adjacent to the base formation;

at a position spaced apart from the hinge formation, a portion of the skirt
formation, defining a portion of its free edge, is attached to the remainder of the cap part
via a frangible formation and forms a tamper evident part;
15

the tamper evident and dispensing parts define complementary engagement
formations configured to permanently interengage upon first displacement of the cap
part into its closed position, thus sealing the closure; and

20 once the complementary engagement formations are interengaged, forcing the
cap part to pivot towards its open position will cause severance of the frangible
formation, leaving the tamper evident part behind on the base formation and permitting
the cap part to pivot and expose the nipple formation.

25 The tamper evident closure of the invention typically is operatively provided on a
container for sealing a liquid in the container. The container and its liquid contents
typically is provided with the cap part of the closure in its closed position with respect to
the base formation of the dispensing part and the frangible formation of the tamper
evident part intact, the tamper evident part thus being permanently engaged with the
30 base formation via the complementary engagement formations. Integrity of the frangible

formation evidences that the closure has never been opened. In order to expose the nipple formation to dispense the liquid content via it, the cap part is pivoted towards its open position and the frangible formation is thus severed. Even after subsequent displacement of the cap part into its closed position, the former frangible formation, now
5 severed, evidences that the closure has already been opened.

The tamper evident closure may be configured so that, upon first displacement of the cap part into its closed position, the complementary engagement formations interengage with the tamper evident part in a first position, in which clearance is provided providing
10 for the tamper evident part to be displaced, under the force of gravity whilst the dispensing part is orientated with its nipple formation pointing upwards and after severing of the frangible formation, into a second position which is below the first so that, with the cap part back in its closed position, a visible gap is defined between the tamper evident part and the cap part. Such a gap evidences that the tamper evident
15 closure has already been opened. In a particular embodiment of a tamper evident closure of this type,

the tamper evident part is an elongate band and its engagement formation is a laterally projecting first lip formation defined along at least a part of its length; and
20

the complementary engagement formation of the base formation defines a slot therein for receiving at least a portion of the tamper evident part, including its projecting lip formation, the slot having a narrow entrance and a projecting second lip formation along a side of the entrance for engaging the first lip formation, requiring the first lip
25 formation to be forced through the entrance, past the second lip formation, during first displacement of the cap part into its closed position and, accordingly, the tamper evident part into its first position, the cross-section of the slot expanding beyond its entrance and providing the clearance permitting displacement of the tamper evident part into its second position, as referred to above.

In the type of tamper evident closure referred to above in which the engagement formation defined by the dispensing part defines a slot, the dispensing part may include two wall formations projecting from the base formation, defining the slot between them.

- 5 In the tamper evident closure of the invention, the tamper evident part may be at a position on the cap part opposite to the hinge formation.

In the tamper evident closure of the invention, the base formation of the dispensing part may include

- 10 a depending skirt formation defining therein an engagement formation for cooperating with a complementary engagement formation defined by a rim defined by a neck of a container around its orifice; and

- 15 a tamper indicator ring, secured to the skirt formation via a frangible formation, for operatively indicating removal of the closure from a container.

- The tamper indicator ring may be conventional and, as such, will not be elaborated on herein. Suffice it to state that it will define an engagement formation for engaging a
20 complementary engagement formation defined by a neck of a container upon fitting the closure to the neck. Thereafter, the tamper indicator ring evidences whether or not the closure has been removed from the container.

- The invention is described below by way of an example of an embodiment of a tamper
25 evident closure, in accordance with the invention, with reference to and as illustrated in the accompanying diagrammatic drawings. In the drawings:

- Figure 1 shows a perspective view of an embodiment of a tamper evident closure, in accordance with the invention, in an open configuration thereof after it had
30 already been closed at least once;

Figure 2 shows a section of the closure of Figure 1 in its configuration in which it has been moulded, with a cap part thereof in an open position with respect to a dispensing part thereof;

5

Figure 3 shows a section of the closure of Figure 1 with its cap part in a closed position with respect to its dispensing part and before first opening of the closure;

10 Figure 4 shows a section of the closure of Figure 1 in a semi-open configuration thereof after it had already been closed at least once;

Figure 5 shows an enlarged partial section of the closure of Figure 1, with its cap part in a closed position with respect to its dispensing part and before first opening of the closure; and

15

Figure 6 shows an enlarged partial section corresponding to the section of Figure 5, but with its cap part in a closed position with respect to its dispensing part after it had already been opened at least once.

20 In Figure 1, an embodiment of a tamper evident closure, in accordance with the invention, is designated generally by the reference numeral 10. The entire closure 10 is formed of injection moulded plastic and includes a dispensing part 12, a cap part 14, and a tamper evident part in the form of an elongate tamper evident band 16. It will be apparent from the remainder of this description that, in the form in which the closure 10
25 is moulded, the tamper evident band 16 forms a part of the cap part 14.

The dispensing part 12 is shown in an upright orientation thereof and will now be defined in this orientation. It includes:

30 a vertically disposed cylindrical skirt formation 18;

a tamper evident ring 20 attached to the bottom of the skirt formation 18;

5 a horizontally disposed top wall formation 22 at the top of the skirt formation 18,
the skirt formation thus depending from the top wall formation;

a dispensing nipple formation 24, coaxial with the skirt formation 18 and defining therein a discharge orifice 26;

10 a first arcuate wall formation 28, disposed near the perimeter of the wall formation 22 and coaxial with the skirt formation 18; and

15 a second arcuate wall formation 30, slightly longer than the first wall formation on the inside of the first wall formation 28, the wall formations defining a slot 31 between them.

The cap part 14 includes a dome formation 32, defining an axis of radial symmetry, two concentric inner skirt formations 34 and 36, projecting from the inside of the dome formation 32 and sharing its axis of symmetry, and two lengths of outer skirt formation 20 38.1 and 38.2, depending from the periphery of the dome formation 32. The purpose of each of the skirt formations 34 and 36 will be described below.

25 The cap part 14 is pivotally connected to the dispensing part 12 via a flexible hinge formation 40. Between the lengths of skirt formation 38.1 and 38.2, a gap 42 is defined directly opposite to the hinge formation 40.

30 With reference particularly to Figure 2, the dispensing part 12 defines, within the skirt formation 18, both a peripheral seat formation 44 and an engagement formation including an inner helical thread 46. In use of the closure on a matching container, the seat formation 44 is seated on a matching rim defined by the neck of the container

around the orifice of the container and the helical thread 46 is engaged with a matching outer helical thread defined by the rim. The tamper evident ring 20 is attached to the skirt formation 18 via a frangible formation including a plurality of bridge formations 48. The tamper evident ring 20 defines on its inside peripheral engagement formations 50 for releasably engaging a peripheral ridge formation defined around a neck of a matching container. After screwing the dispensing part 12 onto a rim of a neck of a matching container, unscrewing of the part 12 will cause the tamper evident ring 20 to be severed from the skirt formation 18. Insofar as the tamper evident ring 20 is conventional, it will not be elaborated on herein.

In Figure 2, the closure 10 is shown in its configuration in which it was moulded. The tamper evident band 16 forms a part of the cap part 14 and is attached to the remainder of the cap part via a frangible formation 52. The tamper evident band 16 particularly extends along the gap 42 (see Figure 1) defined between the two lengths of skirt formation 38.1 and 38.2 and defines, along with these two lengths, a skirt formation along the entire periphery of the dome formation 32 except for a region at the hinge formation 40. The skirt formation defines a stepped free edge 43 along its side opposite to the dome formation 32, of which a portion is defined by the tamper evident band 16. The band 16 defines along the portion of the free edge 43 defined thereby a laterally outwardly projecting engagement formation in the form of a first lip formation 53.

The wall formation 28 defines in its inner surface a horizontally disposed notch 54 along its entire length and, as such, defines above the notch an engagement formation in the form of a horizontally disposed second lip formation 55, complementary to the first lip formation 53. In cross-section, the slot 31 thus defines a narrow entrance at the lip formation 55, from where it expands in the region of the notch 54.

With reference particularly to Figures 1 and 2, the tamper evident band 16 particularly is shaped to fit into the slot 31 defined between the wall formations 28 and 30.

In Figure 3, the cap part 14 has been displaced into a closed position with respect to the dispensing part 12, corresponding to the closed configuration of the closure 10. The free edge 43 of the skirt formation, comprising the lengths of skirt formation 38.1 and 38.2 and the tamper indicator band 16, of the cap part 14 is seated on the wall formation 22 (see Figure 1) of the dispensing part 12. An inner surface of the skirt formation 36 is peripherally seated around a complementary outer ridge formation 58 defined by the nipple formation 24 and an outer edge formation of the skirt formation 34 is peripherally seated around a complementary inner surface 59 defined by the nipple formation. As such, a hermetically sealing fit is provided between the nipple formation 24 and the cap part 14, effectively sealing the orifice 26.

Through displacement of the cap part 14 into its closed position, the tamper evident band 16 has been received within the slot 31 defined between the wall formations 28 and 30 and the lip formation 53 of the tamper evident band 16 has been displaced past and thus permanently engaged with the lip formation 55 defined by the wall formation 28. The width of the tamper evident band 16 at the lip formation 53 exceeds the width of the entrance of the slot 31 at the lip formation 55 so that displacement of the lip formation 53 past the lip formation 55 requires elastic deformation of the material of these formations. The band 16 is thus held captive by the wall formations 28 and 30 and, accordingly, by the dispensing part 12. The band 16 is in a first position with respect to the dispensing part 12, as is shown also in Figure 5.

With reference particularly to Figure 5, with the tamper evident band 16 in its first position, within the slot 31 (see Figure 2) a gap 62 is defined below the band 16 and above the dispensing part 12. As such, clearance is provided within the slot 31 for displacement of the band 16 into a second position, as will be described below.

In Figure 4, the cap part 14 has been displaced out of its closed position with respect to the dispensing part 12 into a semi-open position. This has caused the frangible formation 52 to be severed and the tamper evident band 16 has remained held captive

by the wall formations 28 and 30.

With reference now particularly to Figure 6, upon the tamper evident band 16 being separated from the cap part 14, the band 16 is displaced under the force of gravity into a second position below its first position, as shown here, thus closing the gap 62 shown in Figure 5. With the cap part 14 displaced back into its closed position with respect to the dispensing part 12, a gap 64 is defined at the frangible formation 52, now severed, due to the displacement of the band 16 from its first to its second position. The width of the gap 64 is at least substantially equal to the width of the gap 62 (see Figure 5) that existed before. The gap 64 is visible from the outside of the closure 10 and provides clear evidence of the fact that first opening of the closure 10 has occurred.

With reference particularly to Figure 1, as the tamper evident band 16 remains held captive by the wall formations 28 and 30, it will, after use of the closure 10, typically be disposed of together with a container on which the closure is provided. As such, the likelihood of littering caused by the tamper evident band 16 due to disposal thereof separate from the container is reduced.

CLAIMS

1. A tamper evident closure which includes

5 a dispensing part including a base formation, for seating on and sealingly engaging a rim defined by a neck of a container around its orifice, and a dispensing nipple formation, projecting from the base formation; and

10 a cap part including a dome formation and a skirt formation along at least a part of the periphery of the dome formation, the skirt formation defining a free edge along its side opposite to the dome formation,

and in which

15 the cap part is connected to the dispensing part via a hinge formation and the closure is injection moulded with the cap part in an open position with respect to the dispensing part, in which the cap part does not cover the nipple formation and from which, once the closure is removed from the mould, the cap part is pivotally displaceable about the hinge formation into a closed position with
20 respect to the dispensing part, in which it covers the nipple formation and hermetically seals it and in which the free edge of the skirt formation is disposed adjacent to the base formation;

25 at a position spaced apart from the hinge formation, a portion of the skirt formation, defining a portion of its free edge, is attached to the remainder of the cap part via a frangible formation and forms a tamper evident part;

30 the tamper evident and dispensing parts define complementary engagement formations configured to permanently interengage upon first displacement of the cap part into its closed position, thus sealing the closure; and

once the complementary engagement formations are interengaged, forcing the cap part to pivot towards its open position will cause severance of the frangible formation, leaving the tamper evident part behind on the base formation and permitting the cap part to pivot and expose the nipple formation.

2. A tamper evident closure as claimed in Claim 1, which is configured so that, upon first displacement of the cap part into its closed position, the complementary engagement formations interengage with the tamper evident part in a first position, in which clearance is provided providing for the tamper evident part to be displaced, under the force of gravity whilst the dispensing part is orientated with its nipple formation pointing upwards and after severing of the frangible formation, into a second position which is below the first so that, with the cap part back in its closed position, a visible gap is defined between the tamper evident part and the cap part.

3. A tamper evident closure as claimed in Claim 2, in which

the tamper evident part is an elongate band and its engagement formation is a laterally projecting first lip formation defined along at least a part of its length;

the complementary engagement formation of the base formation defines a slot therein for receiving at least a portion of the tamper evident part, including its projecting lip formation, the slot having a narrow entrance and a projecting second lip formation along a side of the entrance for engaging the first lip formation, requiring the first lip formation to be forced through the entrance, past the second lip formation, during first displacement of the cap part into its closed position and, accordingly, the tamper evident part into its first position, the cross-section of the slot expanding beyond its entrance and providing the clearance permitting displacement of the tamper evident part into its second position, as

referred to above.

4. A tamper evident closure as claimed in Claim 3, in which the engagement formation defined by the dispensing part includes two wall formations projecting from the base formation, defining between them the slot.

5. A tamper evident closure as claimed in any one of the preceding claims, in which the tamper evident part is at a position on the cap part opposite to the hinge formation.

6. A tamper evident closure as claimed in any one of the preceding claims, in which the base formation of the dispensing part includes

a depending skirt formation defining therein an engagement formation for cooperating with a complementary engagement formation defined by a rim defined by a neck of a container around its orifice; and

a tamper indicator ring, secured to the skirt formation via a frangible formation, for operatively indicating removal of the closure from a container.

7. A tamper evident closure as claimed in Claim 1, substantially as herein described with reference to and as illustrated in the accompanying diagrammatic drawings.

Application No: GB0619255.3

Examiner: Mr Niels Mathiesen

Claims searched: 1-7

Date of search: 11 January 2007

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1 at least	US 2003/0034323 A1 [Smith et al] whole document relevant
A	-	FR 2842177 A (BERICAP)
A	-	WO97/37900 A (CARNAUDMETALBOX)
A	-	WO98/57864 A (APTARGROUP INC.)

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category	P	Document published on or after the declared priority date but before the filing date of this invention
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X:

Worldwide search of patent documents classified in the following areas of the IPC

B65D

The following online and other databases have been used in the preparation of this search report

EPODOC, WPI